

REMARKS

By the foregoing Amendment, Claims 1, 8 and 14 have been amended, and Claims 2, 4, 9, 10, 15 and 16 have been canceled. The specification has also been reviewed for minor errors and amended as requested by the Examiner. A marked up version showing the changes made is attached. Favorable reconsideration of the application is respectfully requested.

Claims 1-5 and 7 were rejected under 35 U.S.C. 102(a) on the grounds of anticipation by Hidetsugu, teaching an oxygen-generating composition which may include strontium peroxide. Claims 2 and 4 have been canceled. Claim 1 has now been amended to recite "cobalt oxide as a catalyst." Hidetsugu teaches that iron oxide had a large catalytic effect, and that strontium peroxide also increased the linear burning rate, but Hidetsugu does not teach or suggest the use of cobalt oxide as a catalyst. It is therefore respectfully submitted that the claims are novel and inventive over Hidetsugu, and that the rejection of Claims 1-5 and 7 on the grounds of anticipation by Hidetsugu should be withdrawn.

Claims 1-19 were rejected under 35 U.S.C. 102(b) on the grounds of anticipation by WO9743210, which teaches the use of strontium peroxide in combination with copper oxide and/or nickel oxide as a catalyst. Claim 1 has now been amended to recite "cobalt oxide as a catalyst." Claims 8 and 14 have been amended to recite "about 0.5-4%

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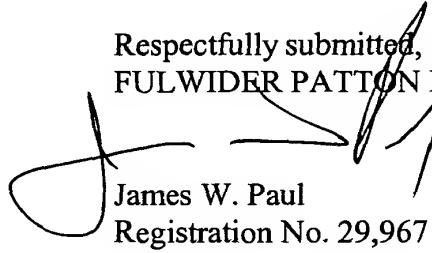
by weight of cobalt oxide as a catalyst.” As is noted in the specification from page 9, line 30, to page 10, line 6, “When used together with transition metal oxide catalysts such as cobalt oxide, strontium peroxide serves as a reaction rate modifier that slows down the reaction and makes the reaction proceed in a controlled and organized way.” Support for the limitation of 0.5 to about 4% strontium peroxide can be found in the specification at page 11, line 9, and in the examples. WO9743210 does not teach or suggest the use of cobalt oxide as a catalyst. It is therefore respectfully submitted that the claims are novel and inventive over WO9743210, and that the rejection of Claims 1-19 on the grounds of anticipation by WO9743210 should be withdrawn.

The prior art made of record and not relied upon has been reviewed, and it is believed that these references are no more pertinent than the references applied by the Examiner.

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In light of the foregoing, it is respectfully submitted that the application should now be in a condition for allowance, and an early favorable action in this regard is respectfully requested.

Respectfully submitted,
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The paragraph at page 6, lines 15-22 has been amended to read as follows:

Strontium peroxide [provide] provides all the benefits without the problems associated with the use of sodium oxide and peroxide, barium peroxide, lithium peroxide, calcium hydroxide and magnesium oxide and hydroxide. Strontium peroxide is more alkaline than magnesium oxide and calcium hydroxide and thus is more effective as a chlorine suppressant. It is not as caustic as sodium oxide and peroxide. Strontium peroxide is not considered toxic and thus is more environmentally friendly. It is stable enough so that water can be added to the compositions containing strontium peroxide, to facilitate the mixing and pressing.

The paragraph at page 7, lines 1-7 has been amended to read as follows:

Strontium peroxide is a moderately active catalyst for the decomposition of the chlorate and perchlorates by itself and is a moderately active inhibitor for the decomposition

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when used with an active transition metal oxide catalyst such as cobalt oxide. Therefore, several percent of strontium peroxide can be used in the compositions. It is much easier to distribute several percent of strontium peroxide than to distribute a fraction of a percent of the other alkaline compounds in the chlorate and perchlorates.

The paragraph at page 7, lines 14-20 has been amended to read as follows:

Strontium peroxide decomposes at 410°C to strontium oxide and oxygen and thus can be used as a secondary oxygen source. This would increase the overall oxygen yield of the chemical cores with other things being equal. Therefore, chemical oxygen generating compositions with strontium peroxide as a chlorine suppressant, catalyst, reaction rate modifier, and a secondary oxygen source [is] are superior to chemical oxygen generating compositions using other chlorine suppressants, and reaction rate modifiers.

The paragraph from page 8, line 21, to page 9, line 5 has been amended to read as follows:

The invention is accordingly embodied in an oxygen generating composition for producing a breathable oxygen gas upon activation of a chemical oxygen generator

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containing a chemical core made of the chemical composition comprising an oxygen source selected from the group of alkali metal chlorates, alkali metal perchlorates, and mixtures thereof, a metal powder fuel, and strontium peroxide as a chlorine suppressant, catalyst, reaction rate modifier and a secondary oxygen source. The chemical oxygen generating composition can optionally also comprise a transition metal oxide catalyst and can further include a binder as a press aid. The chemical core generally has more than one layer, and each layer has a different composition. The chemicals for each layer [is] are mixed separately, and a small amount of water is used to wet the chemicals to facilitate the mixing. The several chemical ingredients in the composition have different particle sizes and different densities. Without water these ingredients tend to segregate from each other. When water is added to the mixture, however, the minor ingredients will stick to the chlorate and perchlorate particles and do not segregate.

The paragraph at page 9, lines 6-14 has been amended to read as follows:

In a presently preferred embodiment, the oxygen generating composition of the invention generally comprises about 0.5-15% by weight of a metal powder as a fuel to supply the extra heat to sustain the decomposition of the oxygen source. The presently preferred fuel includes tin powder and iron powder, or a combination of the two powders.

Other metal powders such as titanium and copper can also be used as fuels, as long as they have high purity and a small particle size. Aluminum and magnesium can also be used because they are substantially free of carbon and are energetic, and other similar metal powders or other types of fuels may also be suitable as a fuel to supply the extra heat to sustain the decomposition of the oxygen source.

The paragraph at page 9, lines 15-27 has been amended to read as follows:

The oxygen generating composition may optionally contain up to about 15% of a transition metal oxide catalyst, and in a presently preferred embodiment, the oxygen generating composition comprises from zero to about 12% by weight of a transition metal oxide catalyst. The transition metal oxide catalyst can, for example, be selected from the group consisting of cobalt oxide, nickel oxide, copper oxide, and mixtures thereof. Since these metal oxide catalysts are so active that the decomposition of the alkali metal chlorate and perchlorate oxygen source can occur in the solid phase. Decomposition in the solid phase may result in an erratic or uneven oxygen flow rate and thus is not preferred. Therefore, it is beneficial to use a reaction rate modifier to reduce the catalytic activity of the catalysts slightly so that the decomposition of the oxygen source occurs in a viscous partially molten phase. This permits smooth release of the oxygen gas generated through the

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decomposition of the alkali metal chlorates or perchlorates.

The paragraph at page 10, lines 16-23 has been amended to read as follows:

The use of strontium peroxide as a chlorine suppressant and at the same time as a catalyst, reaction rate modifier and an additional oxygen source is considered to be critical to this invention. Strontium peroxide in powder form as supplied by Barium & Chemicals Inc. and by Hummel Croton, Inc. [are] is suitable. The strontium [peroxides] peroxide meets MIL-S-612B standards and contains about 92% strontium peroxide, 4-6% strontium carbonate, and 2-4% strontium hydroxide. Strontium peroxide from other sources should also be suitable as long as it has a small particle size and a high content of strontium peroxide.

The paragraph at page 11, lines 4-9 has been amended to read as follows:

In the top layers of a chemical oxygen generating core, strontium peroxide can be used in combination with cobalt oxide so that the top layers can have a high and smooth oxygen flow rate. Strontium peroxide suppresses the catalytic activity of cobalt oxide slightly so that oxygen is generated in a controlled and even manner, and it suppresses the

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formation of chlorine. In a presently preferred embodiment about 0.5 to 4% strontium peroxide can be used in the top layers with cobalt oxide.

The paragraph from page 11, line 29, to page 12, line 9 has been amended to read as follows:

In forming a chemical oxygen generating core, the minor constituents, including the strontium peroxide, the metal powder fuel, the optional transition metal oxide catalyst (if used) and the optional press aid material or binder (if used), are premixed. The premixed minor constituents are then mixed with the chemical oxygen source material. Approximately 1 to 5% water is used to wet down the mixture to facilitate the mixing. The metal powder strontium peroxide typically [have] has a higher density and a smaller particle size than the alkali metal chlorates and perchlorates, and [tend] tends to segregate from the chlorates and perchlorates if no water is used. When water is used, the particles of the chlorates and/or perchlorates are wet, and the minor constituents particles can stick to them to prevent segregation. The chemical cores thus made are then dried in an oven at about 120°C to remove the water added.

EXAMPLE 1 at page 13, lines 13-24 has been amended to read as follows:

EXAMPLE 1

- 1st layer: 15 [gram] grams. 11.0% tin powder, 9.0% Co_3O_4 , 2.0% SrO_2 , 4.0% glass powder and 74.0% NaClO_3 .
- 2nd layer: 37 [gram] grams. 7.0% tin powder, 2.0% SrO_2 , 1.0% glass powder, 2.0% Co_3O_4 , and 88.0% NaClO_3 .
- 3rd layer: 63 [gram] grams. 7.0% tin powder, 2.0% SrO_2 , 1.3% Co_3O_4 , 1.1% glass powder and 88.7% NaClO_3 .
- 4th layer: 90 [gram] grams. 3.5% iron powder, 3.0% SrO_2 , 2.0% glass powder, 91.5% NaClO_3 .
- 5th layer: 40 [gram] grams. 1.5% iron powder, 3.0% SrO_2 , 2.0% glass powder and 93.5% NaClO_3 .

EXAMPLE 2 at page 14, lines 6-17 has been amended to read as follows:

EXAMPLE 2

- 1st layer: 15 [gram] grams. 11.0% tin powder, 9.0% Co_3O_4 , 2.0% SrO_2 , 4.0% glass

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powder and 74.0% NaClO_3 .

2nd layer: 37 [gram] grams. 7.0% tin powder, 2.0% SrO_2 , 1.0% glass powder, 2.0% Co_3O_4 , and 88.0% NaClO_3 .

3rd layer: 63 [gram] grams. 7.0% tin powder, 2.0% SrO_2 , 1.3% Co_3O_4 , 1.1% glass powder and 88.7% NaClO_3 .

4th layer: 90 [gram] grams. 3.5% iron powder, 2.0% SrO_2 , 0.2% Co_3O_4 , 2.0% glass powder, and 92.3% NaClO_3 .

5th layer: 40 [gram] grams. 1.5% iron powder, 3.0% SrO_2 , 2.0% glass powder and 93.5% NaClO_3 .

EXAMPLE 3 from page 14, line 24, to page 15, line 5 has been amended to read as follows:

EXAMPLE 3

1st layer: 20 [gram] grams; 11.0% tin powder, 9.0% cobalt oxide, 1.0% SrO_2 , 3.0% glass powder, and 76.0% NaClO_3 .

2nd layer: 50 [gram] grams; 7.0% tin powder, 2.0% SrO_2 , 2.3% cobalt oxide, 1.5% glass powder, and 87.2% NaClO_3 .

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3rd layer: 90 [gram] grams; 7.0% tin powder, 2.5% SrO₂, 1.4% cobalt oxide, 1.5% glass powder and 87.6% NaClO₃.

4th layer: 120 [gram] grams; 3.5% iron powder, 4.0% SrO₂, 1.5% glass powder and 91.0% NaClO₃.

5th layer: 60 [gram] grams; 2.2% tin powder[.], 4.0 SrO₂, 2.0% glass powder and 91.8% NaClO₃.

EXAMPLE 4 at page 15, lines 12-23 has been amended to read as follows:

EXAMPLE 4

1st layer: 30 [gram] grams; 10.5% tin powder, 9.2% cobalt oxide, 4.0% glass powder, and 76.3% NaClO₃.

2nd layer: 70 [gram] grams; 6.5% tin powder, 0.7% MgO, 2.9% cobalt oxide, 1.0% glass powder, and 88.9% NaClO₃.

3rd layer: 150 [gram] grams; 6.3% tin powder, 0.7% MgO, 1.8% cobalt oxide, and 91.2% NaClO₃.

4th layer: 250 [gram] grams; 5.5% tin powder, 0.8% Ca(OH)₂, 0.88% cobalt oxide, and 92.82% NaClO₃.

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5th layer: 660 [gram] grams; 3.5% iron powder, 4.0 SrO₂, 1.5% glass powder and 91.0% NaClO₃.

IN THE CLAIMS:

Claims 2, 4, 9, 10, 15 and 16 have been canceled.

The claims have been amended as follows:

1. (Amended) An oxygen generating composition for producing a breathable gas upon ignition of the composition, comprising:

a metal powder as a fuel;

cobalt oxide as a catalyst;

5 strontium peroxide; and

an oxygen source selected from the group consisting of alkali metal chlorates, alkali metal perchlorates, and mixtures thereof.

8. (Amended) An oxygen generating composition for producing a breathable gas upon ignition of the composition, comprising:

from zero to about 15% by weight of a metal powder as a fuel;

about 0.1-20% by weight strontium peroxide as a catalyst, a chlorine
5 suppressant, a reaction rate modifier, and a secondary oxygen source;

[from zero to about 15%] about 0.5-4% by weight of [a transition metal oxide]
cobalt oxide as a catalyst;

from zero to about 5% of a binder; and

the remainder of an oxygen source selected from the group consisting of alkali
10 metal chlorates, alkali metal perchlorates, and mixtures thereof.

14. (Amended) An oxygen generating composition for producing a
breathable oxygen gas upon ignition of the composition, comprising:

from zero to about 12% by weight of metal powder as a fuel;

15 about 1-6% by weight strontium peroxide as a catalyst, a chlorine suppressant,
a reaction rate modifier, and a secondary oxygen source;

[from zero to about 10%] about 0.5-4% by weight of [a transition metal oxide]
cobalt oxide as a catalyst;

from zero to about 5% of a binder; and

20 the remainder of an oxygen source selected from the group consisting of alkali
metal chlorates, alkali metal perchlorates, and mixtures thereof.